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DE 019649988 A SU 001823040 A

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(54) Abstract Title
Inflatable solar mirror

(57) An inflatable solar mirror which contains springy rings 1 with a reflective, conical or rotation-parabolic surface. The rings are positioned so that rays impinging on the reflective surface are reflected in a pre-determined manner. The rings are mounted on an inflatable body 2 and can be assembled by means of winged nuts and press studs. The mirror can also include a collapsible air heating chamber 8 where the hot air drives a Ljungstrom turbine 9 so that electricity can be made. Also included is apparatus for pivotably mounting the mirror.

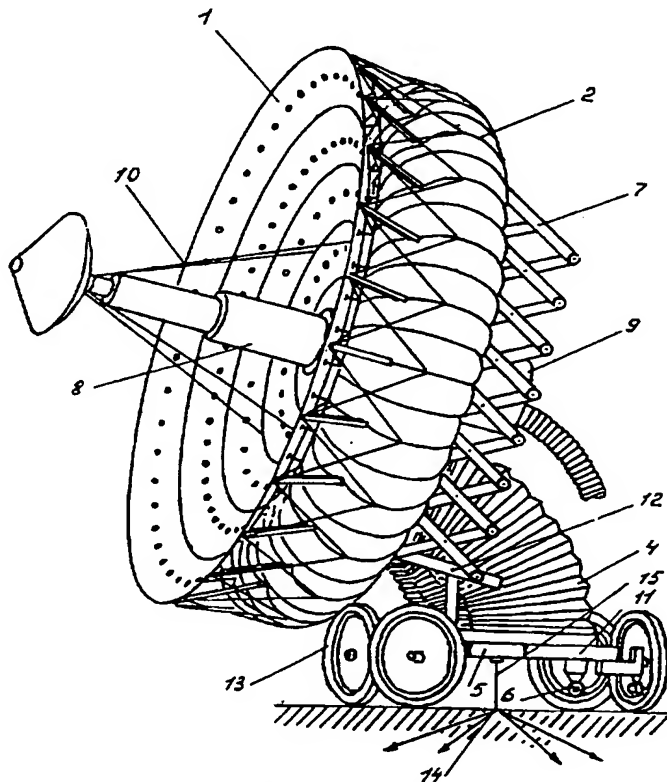
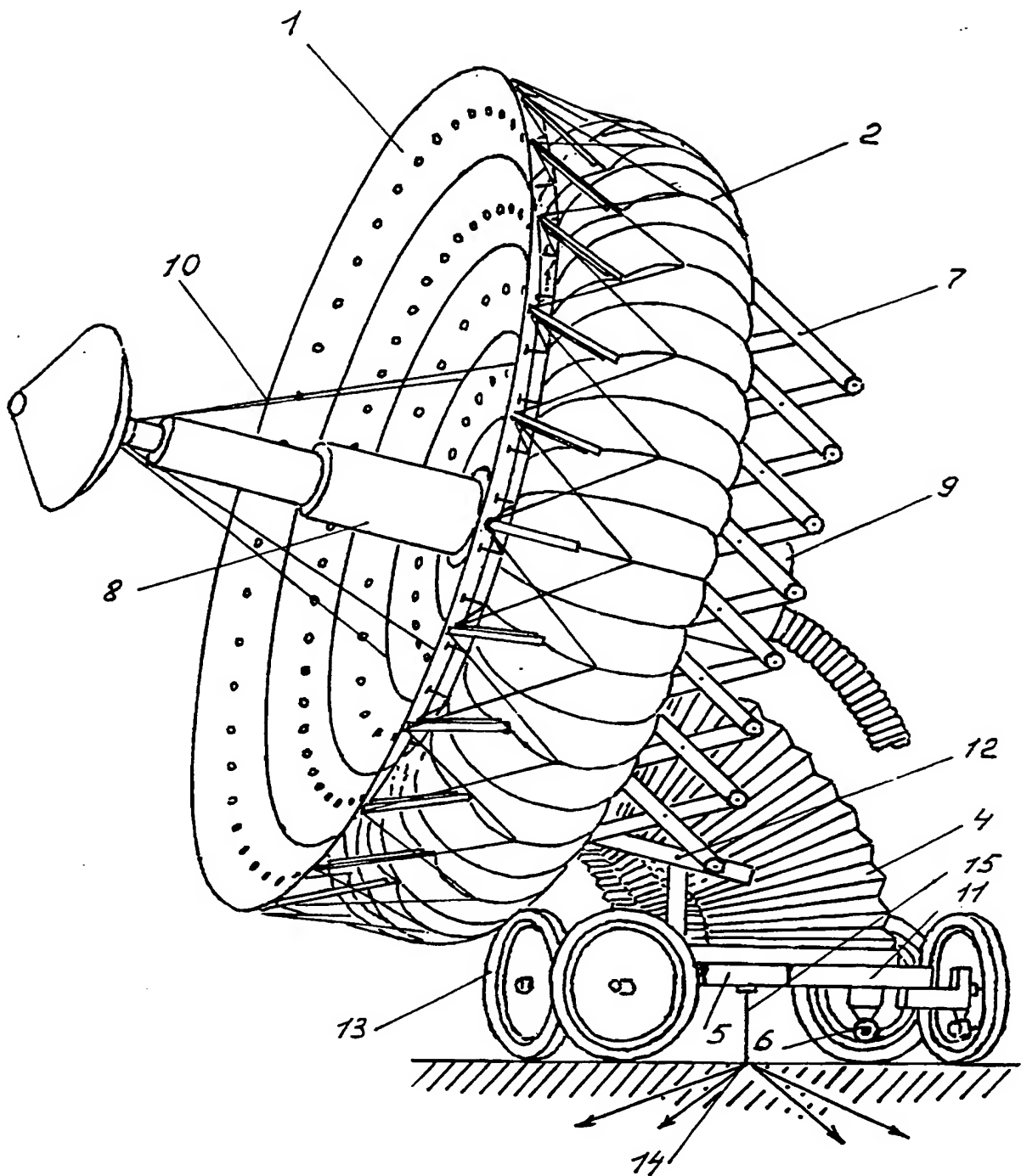
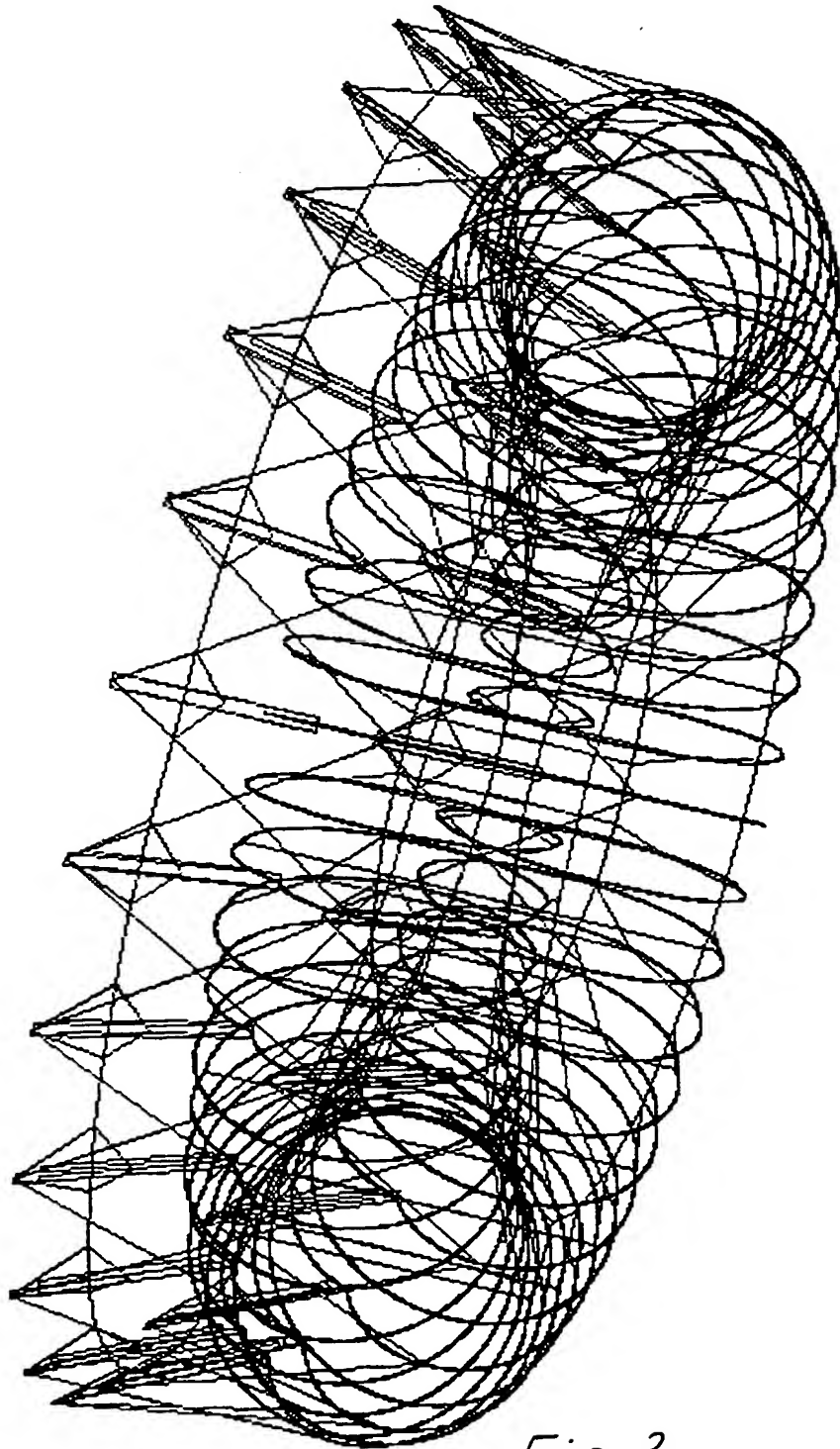
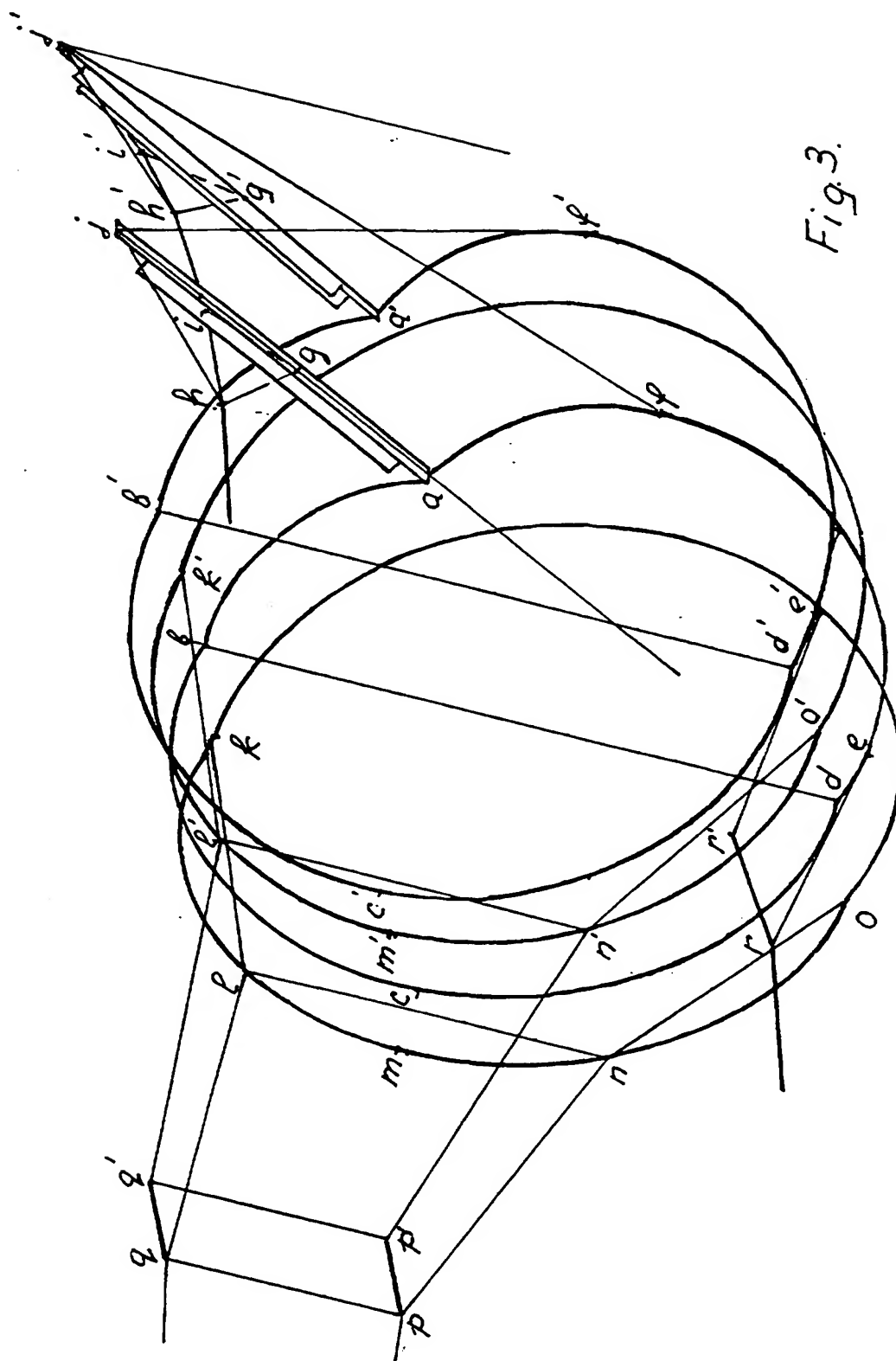


Fig. 1

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*Fig. 2.*



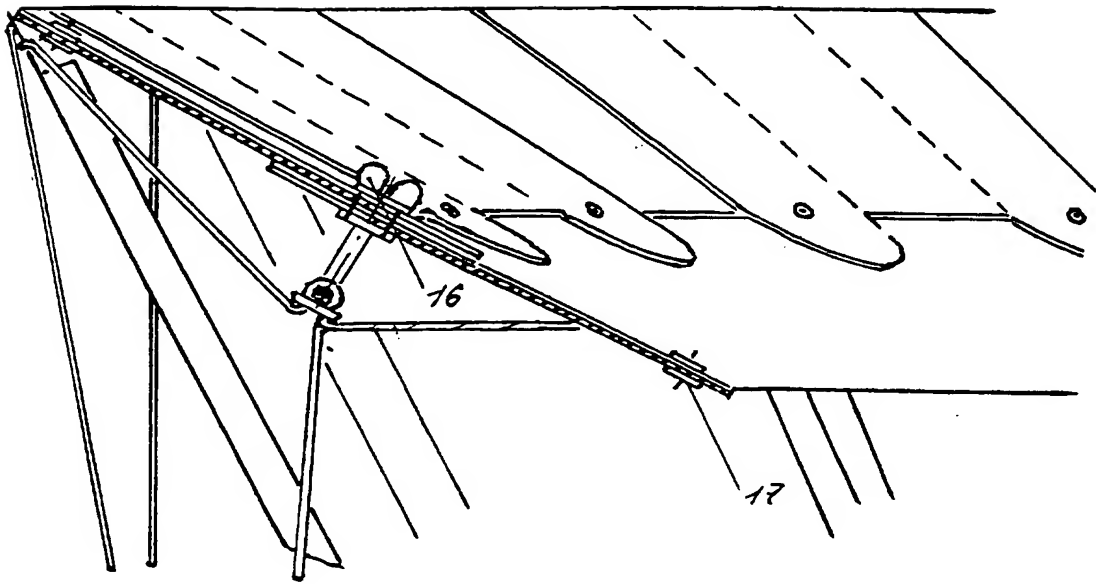


Fig. 4.

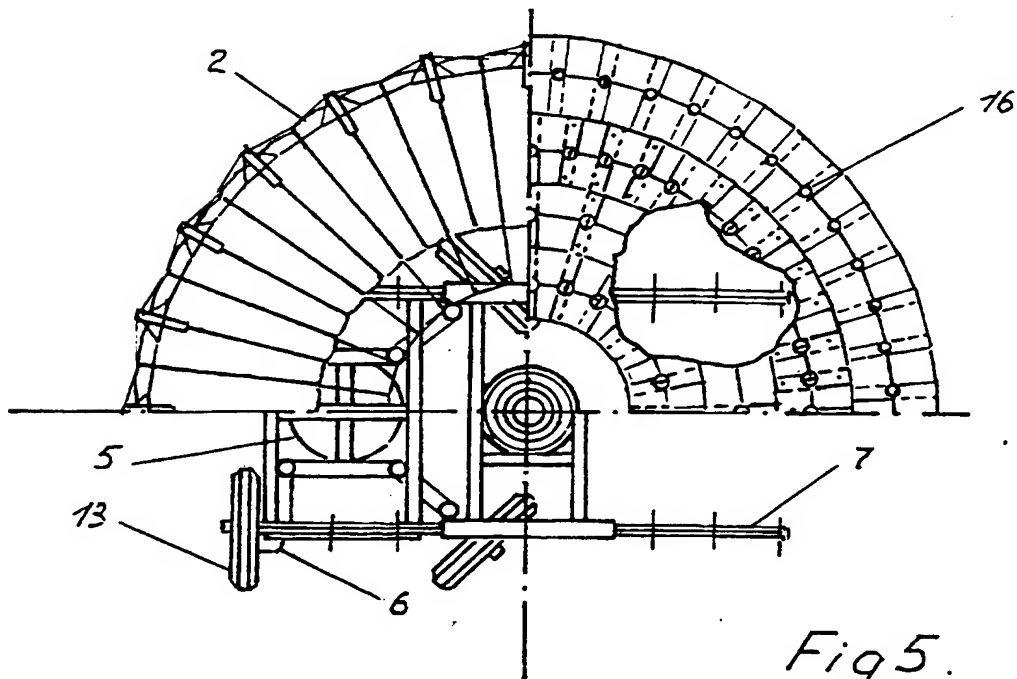
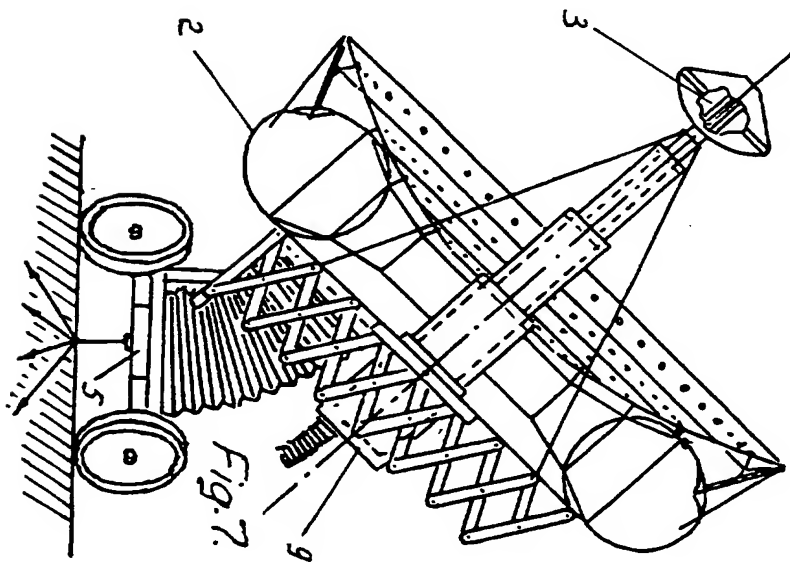
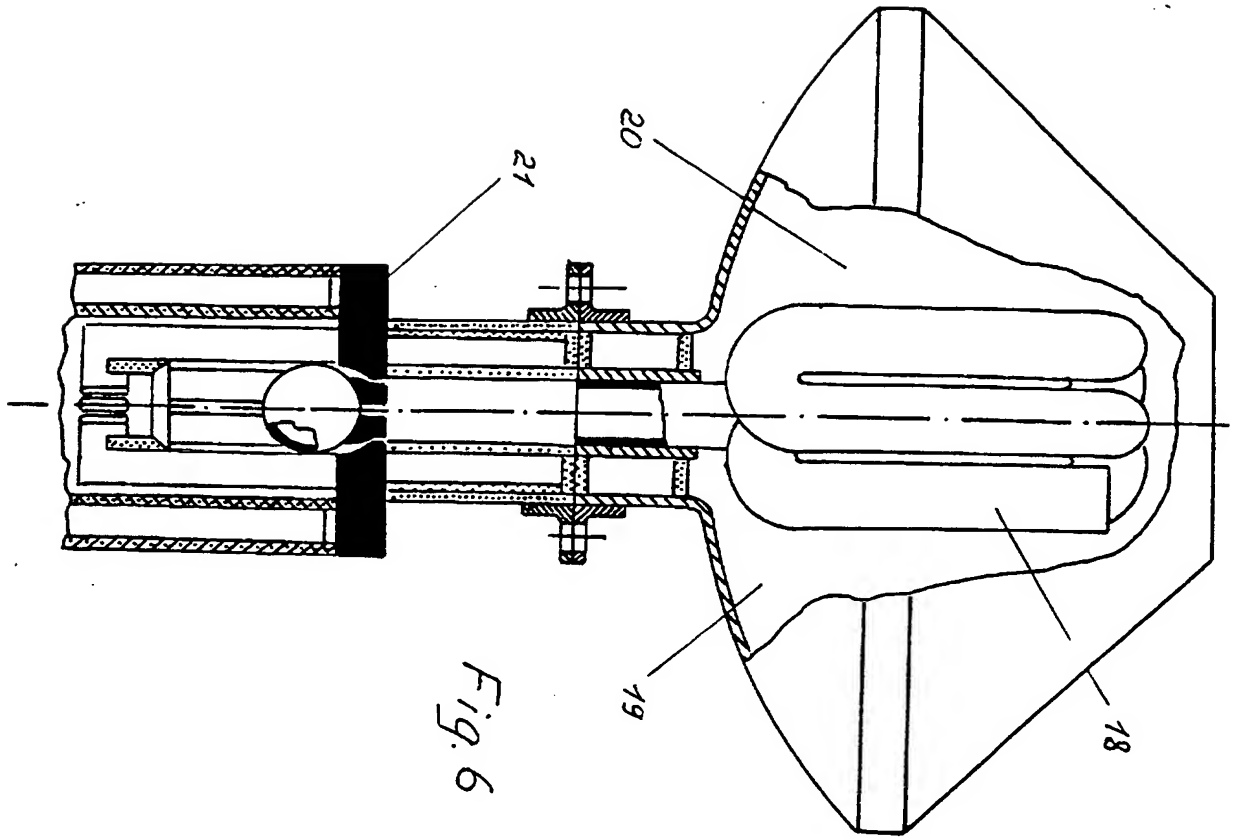
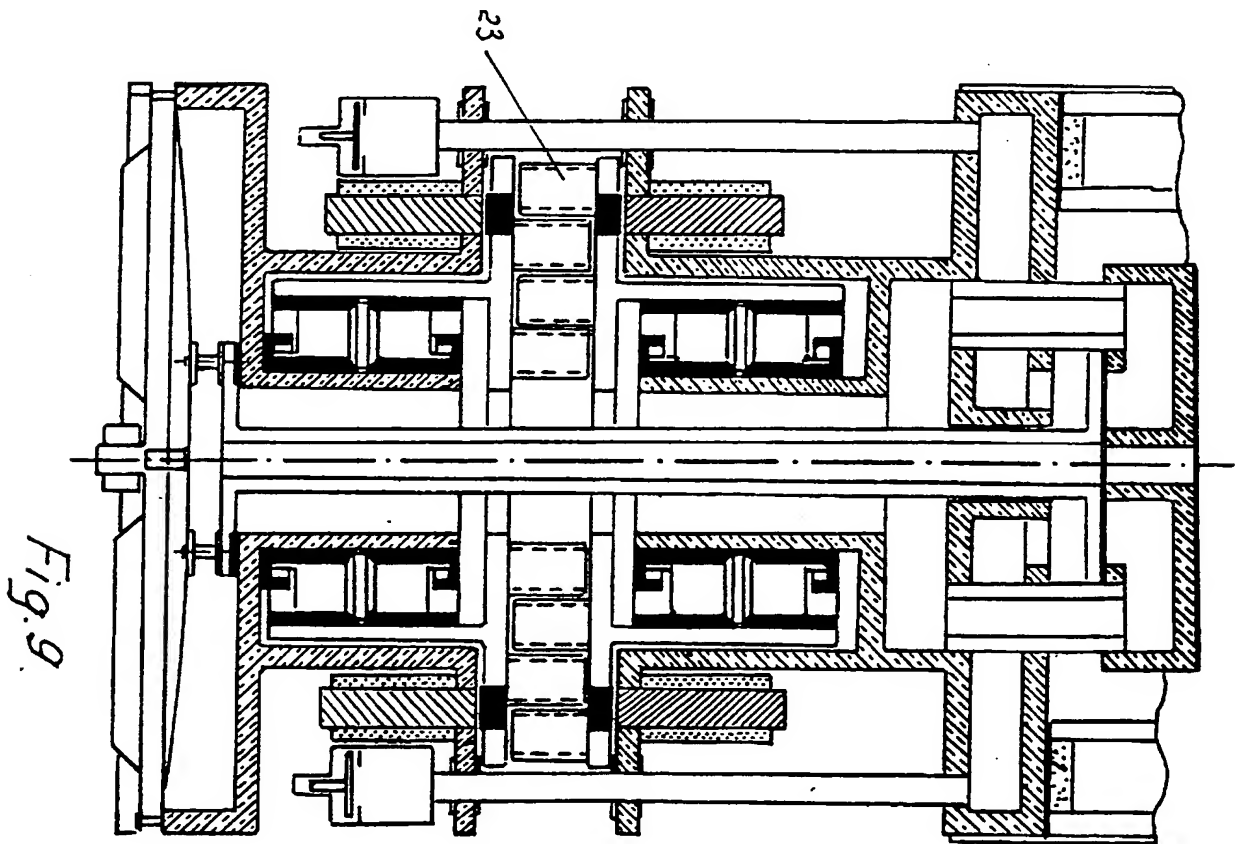
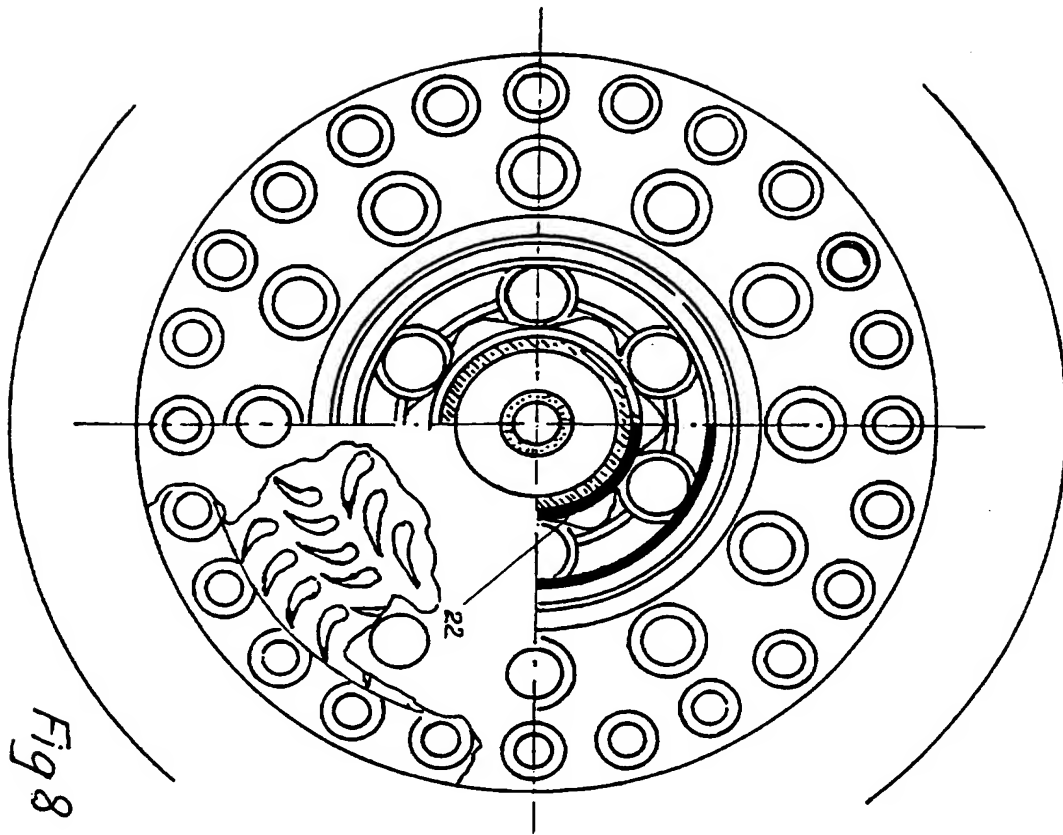


Fig 5.





INFLATABLE SOLAR MIRROR

The present invention relates to a inflatable mirror having a curved reflecting surface and a method of producing such a mirror.

In the past, curved, typically dished mirrors, have been formed of coated metal or glass or solid plastic or polished metal and the accurate curvature of such material is a complex and hence expensive operation. There are also practical limits particularly with regard to cost, and the problems of transporting large rigid objects to the size of which such mirrors can be constructed.

The present invention seeks to provide a mirror which over comes these disadvantages which is easy and cheap to produce and thus has much wider commercial application than the known types of dished and rigid mirrors.

According to the present invention there is provided a construction of mirror which contrary to well known types is not rigid but a inflatable and for that reason pliable, puch-absorbent one. Such quality of the present invention is a prerequisite for the production of extremely light and material-thrifty solar mirrors. There are known inflatable solar mirrors, which focussing reflecting surfaces are formed by two synthetic films, one of which has a metal coating. The films are located one opposite the other and are secured along their edges on a carrying element. The light passes through the first film in its path, and, being reflected from the metallized surface of the other film, concentrates in the latter's focus. To provide for the required curvature of the reflecting surface, gas under pressure is supplied into the cavity of inflatable body.

The drawback of such known inflatable mirrors is that the falling sun rays, when passing through the synthetic film, cause its ageing which results in blooming of the film, reduction of the efficiency of said mirrors and of its mechanical strength. In addition, the film placed in the area of high densety of solar energy is irradiated with sun ultraviolet rays. As a result of this irradiation, holes appear in the film, which violates the hermeticity of the cavity of the inflatable body and reduces its service life.

It is therefore a primary object of the present invention to provide an inflatable solar mirror, whose reflecting surface is exposed directly and hindrancefree to all spectrum of solar radiation on the other hand in which a complete protection of the rubbery casing of the inflatable supporting body against the sun ultraviolet

It is another object of the present invention to provide a mirror, wherein the inflatable body possesses a torus affinitiv form and comprises a plurality of lapping tubes of elastic material and a coat of chain which cover the said plurality.

It is another object of the present invention to provide a mirror with an inflatable body in which links of the chain are the coiled strings whose relative length and relative force to which they are exposed is fixed as a result of a computer simulation for an optimal variant in a table N 1. how the genuine length 'Lg' and genuine force 'Fg' could be calculate from the formulas:

Lg = D*rl.lenght; Fg = D²*(Ptube-Patm)*rl.force; wherein 'D' is the diameter of the mirror 'Ptube' is a pressure within the tube and 'Patm' is an atmospheric pressure.

It is another object of the present invention to provide an apparatus for utilising solar energy including a said mirror being mounted on a carrier so as to be pivotably relative thereto about a first axis substantially perpendicular to a normal axis of the mirror, the carrier being pivotable about a further axis substantially perpendicular to said first axis, so that said normal axis of the mirror can be aligned with the sun, and tracking means for pivoting the mirror about the first axis at a predetermined rate to track the sun through its daily arc; energy conversion means mounted on said carrier in a fixed position relative to the mirror so as to be at a focal point or line of the mirror so that the sun's rays can be focussed on said energy conversion means.

It is another object of the present invention to provide an apparatus wherein said energy conversion means are either a by hot air driven Ljungstromturbine which wheels are equiped with permanent magnets or the said energy conversion means are such as photovoltaic elements.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a general view of mirror in accordance with the present invention.

Figure 2 is a optimal variant of the computer design for the chain-coating of the inflatable body.

Figure 3 is a fraction of the tauted coat of the chain with all links, wherein its relative length and relative force, to which the links are exposed, are presented in Tabelle N 1.

Figure 4 is a springy ring with its components the winged nuts and the press-studs.

Figure 5 is a top view of plurality of the springy rings of the mirror.

Figure 6 is an pulsed airheater at the focussed spot.

Figure 7 is a side view of presented mirror.

Figure 8 and 9 is a turboengine with an electricity producer.

Referring firstly in Figure 1 there is shown a springy rings 1 which are attached to inflatable body 2.

Referring now to Figure 1. a mirror of the type just described is shown mounted on a divergent shearslike frame 7 with a cylindrical collapsible air heating chamber 8 and a hot air driven turbine of Ljungstrom 9. The geometrical axis of the chamber coincides with optical axis of the said mirror. The precision of the coincidence of both axes is ensured by four ropes 10. The frame 7 is itself pivotally mounted on a car 11 by means of axis 12 and a servomotor 4 which is driven by pressured air from a membrane compressor 5. The car 11 with four adjustable wheels 13 and an anchoring 14 is able to rotate around an axes 15 which is perpendicular to earthsurface and to the swivelling axis 12. The wheels 13 are equiped with electric motors 6. The mirror is then arranged to be pivoted by the servomotor 4, compressor 5 and electric motors 6 to thereby track the sun through its daily arc. Equally an electronic drive, controlled by computer (as in modern telescopes) may be used to serve the same purposes. Thus the maximum amount of sunlight always falls on the mirror.

Tabelle N7.

	pos. link set	r.l.lenght	r.l.force	pos. link set	r.l.lenght	r.l.force
1	a(f	0.08222	0.00829	l-n	0.13225	0.00109
2	a(b	0.07463	0.00829	q-p	0.09261	0.00153
3	b(c	0.17097	0.00829	q-q	0.04694	0.04361
4	c(d	0.17109	0.00829	f-j	0.23229	0.00700
5	d(e	0.01406	0.00829	h-g	0.05278	0.00600
6	e(f	0.17545	0.01401	h-j	0.06371	0.00724
7	o(k	0.38122	0.01401	h-i	0.06317	0.00718
8	m(n	0.07115	0.00829	i-h	0.06317	0.03248
9	n(o	0.10571	0.00829	d-r	0.07300	0.00572
10	m(l	0.07115	0.00829	r-r	0.08130	0.04380
11	l(k	0.10571	0.00829	b-d	0.21083	0.00255
12	k-l	0.09478	0.00627	a-g	0.06774	0.00484
13	l-q	0.10520	0.00580	g-j	0.07754	0.01147

CLAIMS

1. A mirror comprising a plurality of springy rings with the reflective, conical or rotation-parabolic surface which united with the inflatable body causes the rings to take up a shape so that rays impinging on the reflecting surface are reflected in a predetermined manner, wherein the manual demountability and remountability of the rings is ensured by the winged nuts and the press-studs.

2. A mirror as claimed in claim 1 wherein the inflatable body possesses a torus-affinitive form and comprises a plurality of lapping tubes of elastic material and a coat of chain which cover the said plurality.

3. A mirror as claimed in claim 2 wherein the links of the chain are the coiled strings whose relative length and relative force to which they are exposed is fixed as a result of a computer simulation for an optimal variant in a table N 1 how the genuine length 'Lg' and genuine force 'Fg' could be calculated from the formulas:

$Lg = D \cdot r_l \cdot \text{length}$; $Fg = D^2 \cdot (P_{\text{tube}} - P_{\text{atm}}) \cdot r_l \cdot \text{force}$;
wherein D is the diameter of the mirror P_{tube} is a pressure within the tube and P_{atm} is an atmospheric pressure.

4. Apparatus for utilising solar energy including a mirror as claimed in any one of the preceding claims, said mirror being mounted on a carrier so as to be pivotably relative thereto about a first axis substantially perpendicular to a normal axis of the mirror, the carrier being pivotable about a further axis substantially perpendicular to said first axis, so that said normal axis of the mirror can be aligned with the sun, and tracking means for pivoting the mirror about the first axis at a predetermined rate to track the sun through its daily arc; energy conversion means mounted on said carrier in a fixed position relative to the mirror so as to be at a focal point or line of the mirror so that the sun's rays can be focussed on said energy conversion means.

5. Apparatus as claimed in claim 4 wherein said energy conversion means are either a by hot air driven Ljungstromturbine which wheels are equipped with permanent magnets or are such as photovoltaic elements.

6. Apparatus including a mirror for harnessing solar energy substantially as described herein with reference to and as illustrated in the accompanying drawings.



Application No: GB 9825863.5
Claims searched: 1 - 6

Examiner: Andrew P Jenner
Date of search: 22 September 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.Q): G2J: JMM, JMF
Int CI (Ed.6): G02B, F24J
Other: World Patents Index, Epodoc, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	DE 19649988 A1 USTINOW	1 - 6
X	SU 1823040 A1 ZATONENKO	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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